Chapter 2

Airport Development

2.1 Delay and the Need for Airport Development

Most analysts would agree that the economic recovery is about complete and that the air transportation industry may even be showing a profit today. Previously, during the sluggish economic period of the past several years, air traffic delay temporarily slipped from newspaper headlines. The number of flights exceeding 15 minutes of delay declined even while commercial air carrier domestic passenger enplanements increased at an annual rate of less than 1 percent. Still, current forecasts indicate that, without capacity improvements, delays would increase substantially over the next decade, though at a somewhat slower pace than in the 1980s.

Even though the FAA's National Plan of Integrated Airport Systems (NPIAS) shows that, with the new improvements planned, capacity at the majority of the 29 hub airports will be adequate to meet the forecast growth in demand, there are still a few problem airports which are predicted to continue to experience significant delay. These are primarily the large metropolitan area airports on the east and west coasts, principally in the northeast and in California. At these airports, planned improvements are not adequate to meet the projected growth in demand.

While the capacity needed to meet future demand will be available at most of the Nation's busiest airports if the improvements planned continue to be funded and built, it remains essential that the aviation community, both the public and private sector, continues to work together to ensure these improvement projects are completed on time.

While the capacity needed to meet future demand will be available at most of the Nation's busiest airports if the improvements planned continue to be funded and built, it remains essential that the aviation community, both the public and private sector, continues to work together to ensure these improvement projects are completed on time. However, the NPIAS points out that, even though capacity improvements are planned at the few delay-problem airports, they will not be enough to meet forecast demand. Delays there will most likely increase as demand increases.

Airport capacity improvements involve these two priorities: (a) continue to plan, fund and build the projects to keep pace with the projected demand for most of the airports in the country, and (b) renewed emphasis must be given to funding innovative solutions for the few delay-problem airports in the Northeast and in California, and elsewhere.

The work of the Airport Capacity Design Teams, which is described in more detail in this chapter, currently emphasizes the first priority. For the few delay-problem airports of the Northeast, California and elsewhere, other options must be explored. New airports, expanded use of existing commercial-service airports, civilian development of former military bases, and joint civilian and military use of existing military facilities are some areas which must be systematically explored with a view toward developing regional airport systems to serve the expanding needs of these large metropolitan areas.

An FAA report to Congress, Long-Term Availability of Adequate Airport System Capacity (DOT/FAA/pp-92-4, June 1992), describes the probable extent of airport congestion in the future, given current trends. The three assessment techniques used in the study all point to a persistent shortfall in capacity at some of the busiest airports in the country as airport development lags behind the growing demand for air travel. The report acknowledges that some of the shortfall may be corrected by such things as improvements in technology and demand management. However, a significant gap in airport capacity will probably remain, and a major increase in the rate of airport development may be needed, together with measures to maximize the efficient use of existing capacity, and, in the longer term, to supplement air transportation with high-speed ground transportation. Development of new airports and options to maximize the efficiency of existing airports will be discussed in this and subsequent chapters.

2.2 New Airport Development

Naturally, the largest aviation system capacity gains result from the construction of new airports. The Denver International Airport, for example, has increased capacity and reduced delays not only in the Denver area but, to some extent, throughout the aviation system. Considering the cost, almost $3 billion for a new airport like Denver, it remains a challenge to finance and build others. In addition, the development of new airports faces environmental, social, and political constraints.

Bergstrom AFB is currently the only major military airfield being converted for civilian use, designed to replace Robert Mueller Airport in Austin, Texas. The Austin city council authorized the issuance of $363 million in airport revenue bonds to cover the cost of developing Austin-Bergstrom International Airport. This, in combination with investment income, passenger facility charge revenues, and airport system

funds, will provide the financial resources necessary to construct the needed airport facilities. Table 2-1 summarizes other major new airports that have been considered in various planning studies by state and local government organizations.

Table 2-1. Major New Airports — Planning Studies or Under Construction

Airport	Purpose	Status
New Denver	Replacement airport for Denver Stapleton (DEN), which will close.	Opened in 1995.
Minneapolis-St. Paul	Replacement airport for MSP. Proposal is to close existing airport.	State legislation was enacted in the Spring of 1996, dropping the option for a new major air carrier airport. Minneapolis-St. Paul will be expanded instead.
West Virginia	Western West VA Regional Airport. Replacement airport for Charleston, Huntington, and Parkersburg.	Feasibility study completed.
Chicago	Supplemental airport.	EA in progress on State of Illinois preferred alternative (Peotone). Estimated completion 8/96.
Seattle-Tacoma	Supplemental airport.	Feasability study completed. Determined that there are no feasable sites for supplemental airport within the 4 county region.
Boston	No active plans for a new airport. Emphasis on greater use of existing outlying airports.	Based on new studies, MASPORT decided not to landbank a new airport.
Atlanta	Supplemental airport.	Satellite study by Atlanta Regional Commission of non-ranked sites completed. Feasibility study by State of Georgia completed.
Northwest Arkansas	Replacement airport for Fayetteville (FYV), which will remain in operation.	Site selection/AMP/EIS completed. Feasibility study completed. Record of Decision signed 8/16/94. Land acquisition underway.
Birmingham, Alabama	Replacement airport. Proposal is to close existing airport.	Site selection completed. Ranked sites and preferred sites identified by State of Alabama.
North Carolina	Cargo/industrial airport.	An existing airport, Kinston, N.C., was selected as the prefered site. EIS process underway.
Eastern Virginia	Supplemental airport.	Regional study by three Councils of Governments.
Austin	Replace Robert Mueller Airport.	Conversion of Bergstrom AFB to civil use.
Phoenix	Regional airport.	Preliminary studies completed. There is no support for establishing a new airport.

2.3 Development of Existing Airports — Airport Capacity Design Teams

As environmental, financial, and other constraints continue to restrict the development of new airport facilities in the United States, an increased emphasis has been placed on the redevelopment and expansion of existing airport facilities. In 1985, the FAA initiated a renewed program of Airport Capacity Design Teams at airports across the country affected by delay. Airport operators, airlines, and other aviation industry representatives work together with FAA representatives to identify and analyze capacity problems at each airport and recommend improvements that have the potential for reducing or eliminating delay. The FAA Technical Center's Aviation Capacity Branch (ACD-130), which has been involved in airport capacity simulation modeling since 1978, provides a ready source of technical expertise.

Aircraft flight delays are generally attributable to one or more conditions, which include weather, traffic volume, restricted runway capability, and NAS equipment limitations. Each of these factors can affect individual airports to varying degrees, but much delay could be eliminated if the specific causes of delay were identified and resources applied to develop the necessary improvements to remove or reduce the deficiency.

Since the renewal of the program in 1985, 38 Airport Capacity Design Team studies have been completed. Currently, four Capacity Team studies are in progress. Table 2-2 provides the status of the program at the airports with Airport Capacity Design Teams, and Figure 2-1 shows the location of each of these airports.

2.3.1 Airport Capacity Design Teams — Recommended Improvements

Airport Capacity Design Teams identify and assess various corrective actions that, if implemented, will increase capacity, improve operational efficiency and reduce delay at the airports under study. These changes may include improvements to the airfield (runways, taxiways, etc.), facilities and equipment (navigational and guidance aids), and operational procedures. The Capacity Teams evaluate each alternative to determine its technical merits. Environmental, socioeconomic, and political issues are not evaluated here but in the master planning process. Alternatives are examined with the assistance of computer simulations provided by the FAA Technical Center at Atlantic

Table 2-2. Status of Airport Capacity Design Teams

Airport Capacity Design Team Status			
Completed			Ongoing
Atlanta	Orlando	Albuquerque	Portland
Boston	Philadelphia	Ft. Lauderdale	Reno/Tahoe
Charlotte/Douglas	Phoenix	Indianapolis	Memphis Update
Chicago	Pittsburgh	Houston Intercont.	Miami Update
Detroit	Raleigh-Durham	Minneapolis-St. Paul	
Honolulu	Salt Lake City	Port Columbus	
Kansas City	San Antonio	Washington-Dulles	
Los Angeles	San Francisco	Oakland	
Memphis	San Jose	St. Louis	
Miami	San Juan, P.R.	New Orleans	
Nashville	**Seattle-Tacoma**	Eastern Virginia	
Cleveland	Las Vegas	Dallas/Ft. Worth	

As of 02-01-96

Items in **bold** indicate that a Capacity Enhancement Update Study has recently been completed. Refer to Section 2.8.

City, New Jersey. In their final report, the Capacity Team recommends certain proposed projects for implementation. However, it should be noted that the presence of a recommended improvement in a Capacity Team report does not obligate the FAA to provide Facilities and Equipment (F&E) or Airport Improvement Program (AIP) funds. Demands for F&E and AIP funds exceed the FAA's limited resources and individual Capacity Team recommended projects must compete with all other projects for these limited funds.

Table 2-3 summarizes these recommendations according to generalized categories of improvements. The Design Teams have developed more than 500 recommendations to increase airport capacity. Proposals to build a third or a fourth parallel runway were recommended by Design Teams at fourteen airports, proposals to build both a third and a fourth parallel runway were recommended at seven airports, proposals to build a new runway and a new taxiway were recommended at seven airports, proposals to build a new taxiway only were recommended at eleven airports, and proposals to build a new taxi-

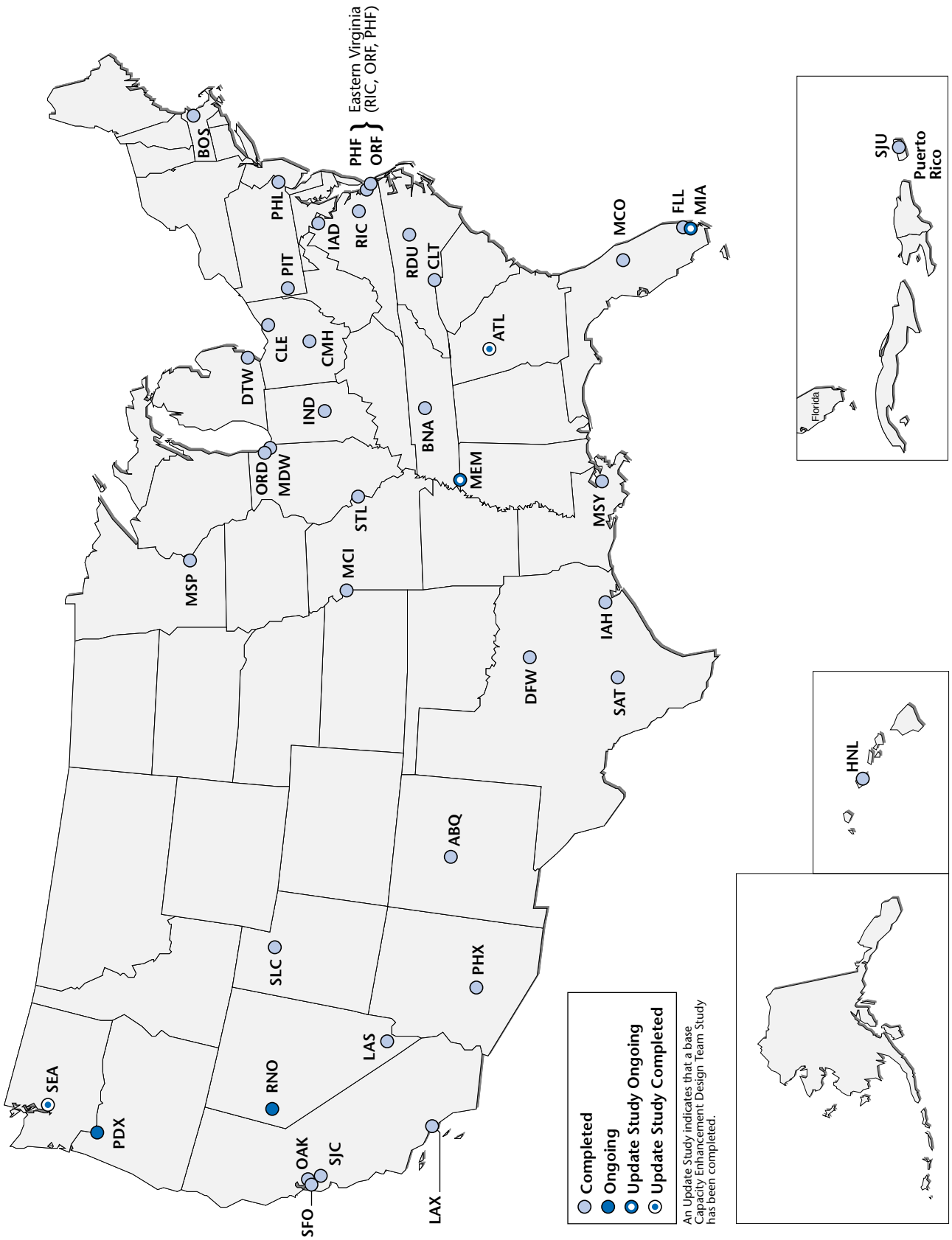

Figure 2-1. Airport Capacity Design Teams in the United States

way and new third and fourth parallel runways were recommended at five airports. Over half the capacity team reports have recommended proposed runway extensions, taxiway extensions, angled/improved exits, or holding pads/improved staging areas.

The only proposed facilities and equipment improvement that was recommended in more than half of the airport studies was the installation or upgrade of Instrument Landing Systems (ILSs) at one or more runways or runway ends, in order to improve runway capacity during IFR operations.

The proposed operational improvements that were recommended in half or more of the studies include improved IFR approach procedures and reduced separation standards for arrivals. One-third of the studies recommended an airspace analysis or restructuring of the airspace. Enhancement of the reliever and general aviation (GA) airport system was recommended at more than half of the airports.

In general, the Capacity Team recommendations demonstrate the FAA's efforts to increase aviation system capacity by making the most use of current airports. In the view of the Airport Capacity Design Teams, the "choke point" most often is found in the runway/taxiway system. Where possible, the construction of a third and even a fourth parallel runway has been proposed. Runway and taxiway extensions, new taxiways, and improved exits and staging areas have been recommended to reduce runway occupancy times and increase the efficiency of the existing runways. In addition to maximizing use of airport land, airports are making the best use of facilities, equipment, and procedures to increase arrival capacity during IFR operations. Equipment is being installed to accommodate arrivals under lower ceiling and visibility minima, including ILSs, RVRs, and improved radar, not to mention new and improved arrival procedures and reduced separation standards for arrivals, both in-trail and laterally.

In general, the Capacity Team recommendations demonstrate the FAA's efforts to increase aviation system capacity by making the most use of current airports.

2.3.2 Airport Capacity Design Teams — Potential Savings Benefits

As can be seen from the summary of Capacity Team recommendations in Table 2-3, the typical Capacity Team will make 20 to 30 recommendations for improvements to reduce delay at each airport. Because of the large number of specific improvements, it is virtually impossible to summarize the expected benefits of each of these recommendations for all the airports. In many cases, however, the recommended improve-

Table 2-3. Summary of Capacity Design Team Recommendations

Airports / Recommended Improvements	Airfield Improvements	Construct third parallel runway	Construct fourth parallel runway	Relocate runway	Construct new taxiway	Runway extension	Taxiway extension	Angled exits/improved exits	Holding pads/improved staging areas	Terminal expansion	Facilities and Equipment Improvements	Install/upgrade ILSs	Install/upgrade RVRs	Install/upgrade lighting system	Install/upgrade VOR	Upgrade terminal approach radar	Install ASDE	Install PRM	New air traffic control tower	Wake vortex advisory system	Operational Improvements	Airspace restructure/analysis	Improve IFR approach procedures	Improve departure sequencing	Reduced separations between arrivals	Intersecting operations with wet runways	Expand TRACON/Establish TCA	Segregate traffic	De-peak airline schedules	Enhance reliever and GA airport system
Richmond						√		√				√	√	√									√		√					
Norfolk						√						√	√	√											√					
Newport News						√		√															√		√					
Washington-Dulles		√			√	√	√		√	√			√	√									√		√				√	√
Seattle-Tacoma *		√						√				√								√			√		√				√	
San Juan, Puerto Rico					√		√	√	√	√				√	√				√	√					√					√
San Jose						√		√	√															√						
San Fransisco		√	√			√	√	√	√															√					√	√
San Antonio		√			√	√	√		√			√	√	√				√		√		√	√		√					√
Salt Lake City		√					√	√	√	√		√	√	√			√	√					√		√					√
St. Louis		√					√	√	√			√		√			√			√			√		√				√	
Raleigh-Durham		√	√	√	√			√	√			√	√				√			√		√	√		√		√			
Pittsburgh			√			√				√		√						√				√								
Phoenix		√			√		√	√	√	√		√		√	√								√	√	√			√	√	√
Philadelphia		√		√		√												√				√	√	√						
Orlando			√		√		√		√			√			√		√	√				√	√					√		√
Oakland					√			√	√																					
New Orleans					√										√				√			√	√		√					√
Nashville			√	√	√	√	√		√			√								√		√	√				√		√	√
Minneapolis-Saint Paul		√	√		√	√		√	√	√		√	√	√	√			√				√			√					√
Miami					√		√	√	√			√	√	√			√						√							√
Memphis		√			√	√	√	√				√											√		√				√	
Los Angeles					√	√	√		√	√		√							√			√								
Las Vegas					√	√	√					√											√			√				√
Kansas City		√	√				√	√	√	√		√	√				√						√		√				√	
Indianapolis		√	√	√	√			√	√			√	√	√			√						√		√					√
Houston Intercontinental		√	√		√	√		√	√	√		√											√						√	√
Honolulu		√				√		√	√	√		√																	√	√
Fort Lauderdale					√	√		√	√	√		√			√	√		√		√		√	√		√				√	√
Port Columbus		√	√	√	√	√		√	√	√		√		√			√	√	√			√	√		√				√	√
Dallas-Ft. Worth					√	√		√															√	√	√					√
Cleveland		√		√	√	√	√	√		√		√			√			√					√	√	√					√
Chicago O'Hare				√	√	√		√	√			√											√			√				
Chicago Midway					√	√			√														√		√					
Charlotte-Douglas		√				√	√	√	√			√		√			√	√								√	√			√
Boston					√	√	√	√	√			√								√			√			√				
Atlanta *					√			√	√	√		√	√	√		√	√			√					√				√	
Albuquerque					√	√	√	√	√	√		√			√								√		√					√

* These recommendations represent options provided in the original Capacity Enhancement Plan for this airport. Since then, a Capacity Enhancement Plan Update Study has been completed. Refer to Section 2.8.

ments to the airfield represent the biggest capacity gains, particularly since they frequently incorporate the benefits of improved procedures and upgraded navigational equipment. Detailed information on specific delay-savings benefits can be found in the final reports of the various Airport Capacity Design Teams.

2.4 Construction of New Runways and Runway Extensions

The construction of new runways and extension of existing runways are the most direct and significant actions that can be taken to improve capacity at existing airports.

The construction of new runways and extension of existing runways are the most direct and significant actions that can be taken to improve capacity at existing airports. Large capacity increases, under both visual flight rules (VFR) and instrument flight rules (IFR), come from the addition of new runways that are properly placed to allow additional independent arrival/departure streams. The resulting increase in capacity is from 33 percent to 100 percent (depending on whether the baseline airport has a single, dual, or triple runway configuration).

Sixty-two of the top 100 airports have proposed new runways or runway extensions to increase airport capacity.

Sixty-two of the top 100 airports have proposed new runways or runway extensions to increase airport capacity.[1] Fifteen of the 23 airports exceeding 20,000 hours of air carrier flight delay in 1994[2] are in the process of constructing or planning the construction of new runways or extensions of existing runways. If no further improvements are made, of the 29 airports forecast to exceed 20,000 hours of annual air carrier delay in 2004, 20 propose to build new runways or runway extensions.

Figure 2-2 shows which of the top 100 airports are planning new runways or runway extensions. Figure 2-3 shows which of the airports forecast to exceed 20,000 hours of annual delay in 2004 are planning new runways or runway extensions. Table 2-4 summarizes new runways and runway extensions that are planned or proposed at the top 100 airports.The total anticipated cost of completing these new runways and runway extensions exceeds $6.0 billion.

1. Airports with runway projects are pictured in Figures 2-2 and 2-3 and summarized in Table 2-4 with the estimated project cost (to the nearest million) and an estimated operational date.
2. At a cost of $1,600 in airline operating expenses per hour of airport delay, 20,000 hours of flight delay translates into $32 million per year.

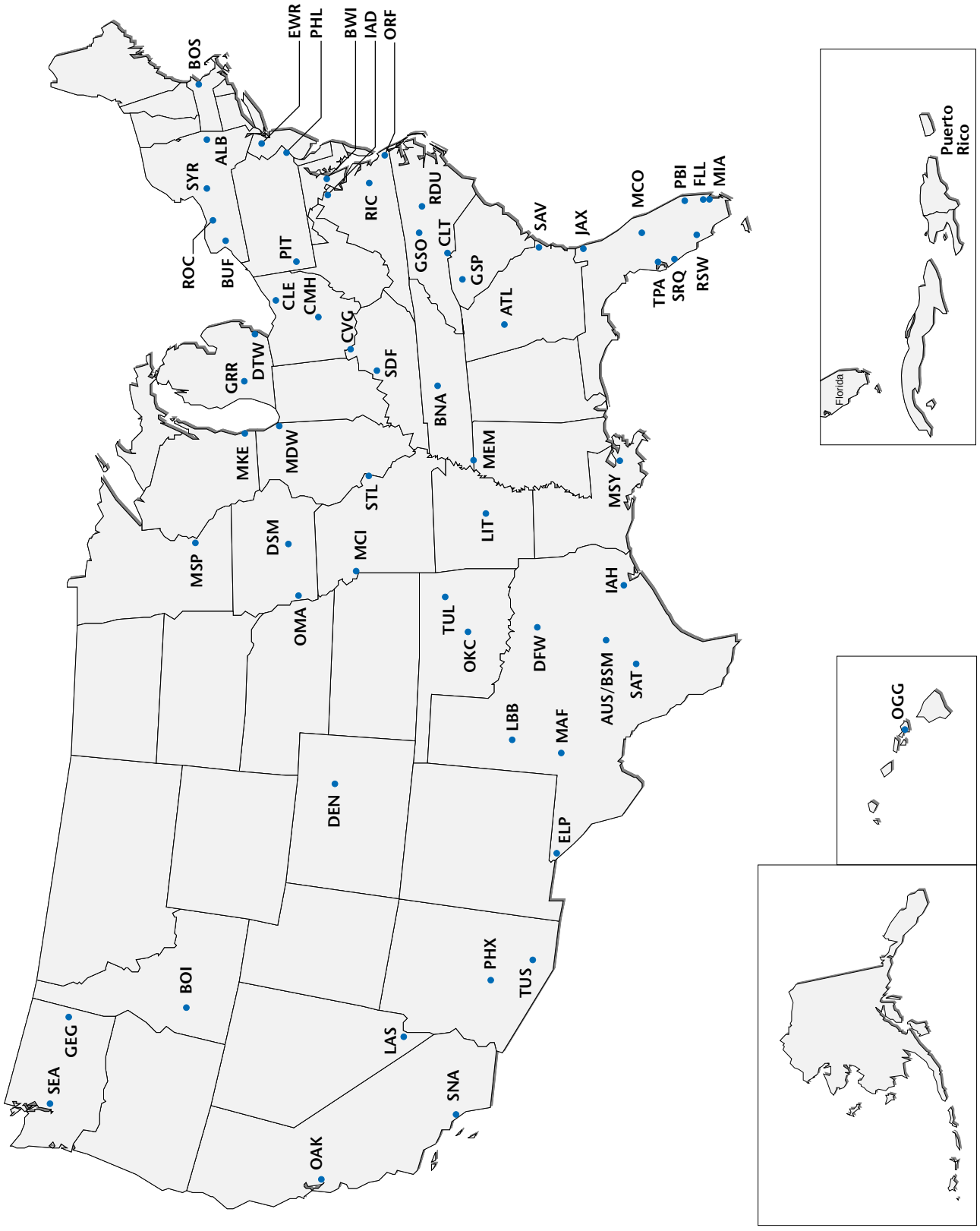

Figure 2-2. New Runways or Runway Extensions Planned or Proposed Among the Top 100 Airports

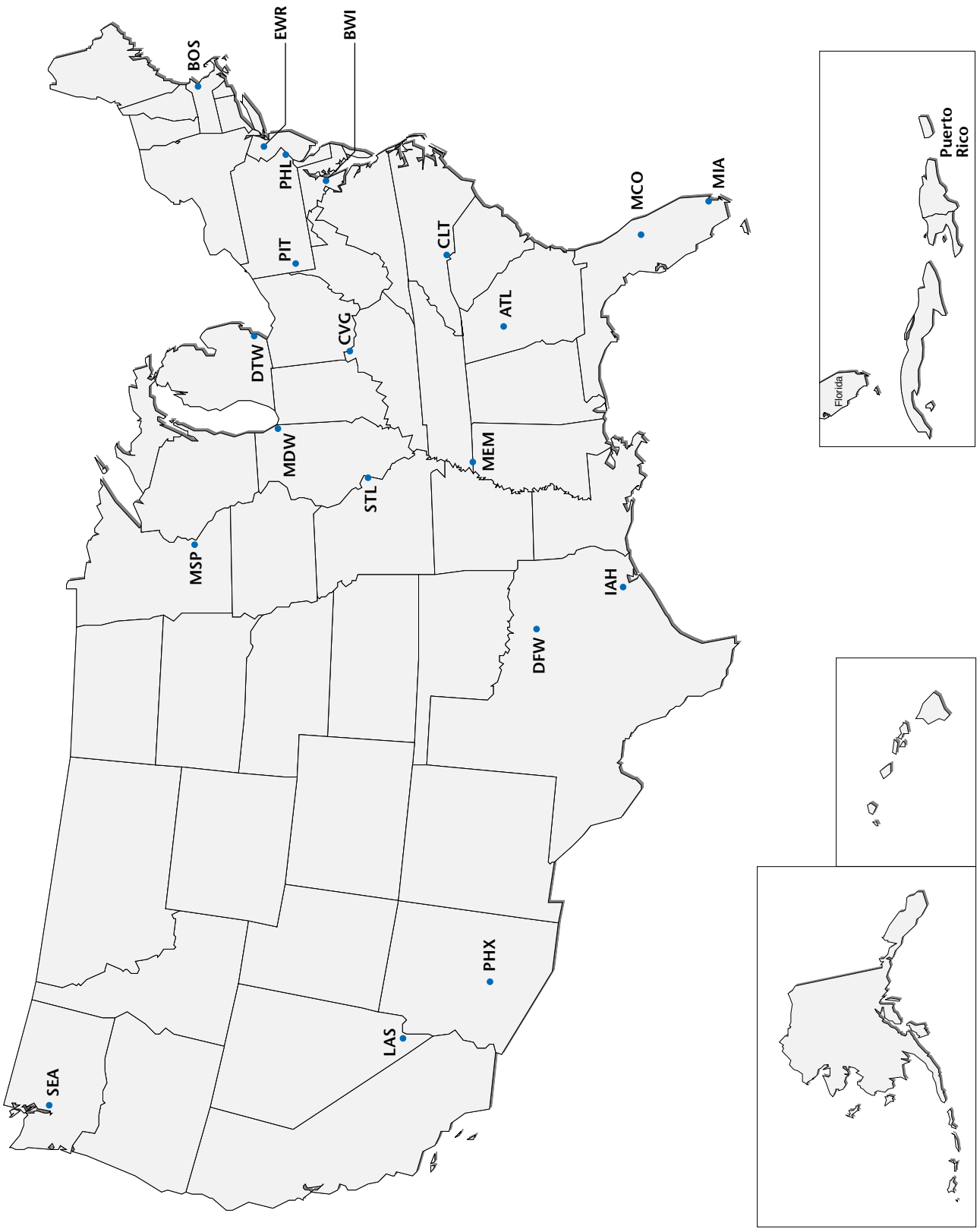

Figure 2-3. New Runways or Extensions Planned/Proposed Among the Airports Forecast to Exceed 20,000 Hours of Annual Aircraft Delay in 2004

Table 2-4. New and Extended Runways Planned or Proposed

Airport	Runway	Est. Cost ($M)	Operational Date
Albany (ALB)	10/28 extension	$5.80	2000
	1R/19L parallel	$7.50	2010
Atlanta (ATL)	5th E/W parallel commuter	$418.00	1999
Austin (BSM) (new airport)	*(see Bergstrom below)*	n/a	n/a
Baltimore (BWI)	10R/28L parallel	n/a	2003
Bergstrom (new Austin)	New airport: 2 Rwys, taxi construction	$447.00	1998
	17L/35R & parallel taxiway	$46.00	1998
	midfield crossfield taxiways	$13.00	1997
	air cargo apron	$4.00	1996
	west runway renovation	$10.00	1996
Boise Trace (BOI)	Rwy 10L/28R extension	$8.00	1998
Boston (BOS)	14/32	n/a	n/a
Buffalo (BUF)	14/32 extension & threshold relocation	$10.00	1998
Charlotte (CLT)	18W/36W 3rd parallel	$70.00	1999
Chicago Midway	4R/22L reconstruction	$32.00	1997
Cincinnati (CVG)	18R/36L extension	$11.00	1996
Cleveland-Hopkins (CLE)	5L/23R replacement	$180.00	1999
	5L/23R extension	$40.00	2001
Port Columbus (CMH)	10L/28R extension & relocation	$22.00	1999
Dallas-Fort Worth (DFW)	18L/36R extension	$25.00	1999
	18R/36L extension	$24.00	1997
	17L/35R new parallel	$300.00	1996
	18R/36L new parallel	$100.00	2001
	17C/35C extension (prev. 17L/35R)	$20.00	1997
Denver International (DEN)	16R/34L parallel	$75.00	2000
Des Moines (DSM)	Rwy 5 extension	$21.50	1999
Detroit (DTW)	4/22 parallel	$116.50	2001
El Paso (ELP)	8/26 parallel	$10.70	n/a
Fort Lauderdale (FLL)	9R/27L extension	$270.00	2002
Fort Myers (RSW)	6R/24L parallel	$87.00	2000
Grand Rapids (GRR)	18/36 extension/realignment to 17/35	$58.00	1997
Greensboro (GSO)	5L/23R parallel	n/a	2010
	14/32 extension	$15.70	2000
Greer (GSP)	3R/21L parallel	$50.00	2015
	Rwy 3 2,000 ft. extension	$25.80	1999
	Rwy 21 1,400 ft. extension	$8.30	1996
Houston Intercontinental (IAH)	14R/32L extension	$8.00	n/a
	8L/26R parallel	$44.00	n/a
	9R/27L parallel	$44.00	n/a
Jacksonville (JAX)	7R/25L parallel	$37.00	2000

Table 2-4. New and Extended Runways Planned or Proposed

Airport	Runway	Est. Cost ($M)	Operational Date
Kahului (OGG)	2/20 extension & strengthen	$40.00	1998
Kansas City (MCI)	1L/19R extension	$12.00	n/a
Las Vegas (LAS)	1L/19R reconstruction	$50.00	1997
Little Rock (LIT)	4L/22R extension & overlay	$31.00	1997
Louisville (SDF)	17R/35L parallel	$59.00	1997
Lubbock (LBB)	8/26 extension	$5.00	2000
Memphis (MEM)	18E/36E new parallel	$146.10	1996
	18C/36C extend/reconstruct (prev. 18L/36R)	$113.70	1999
Miami (MIA)	9N/27N new parallel	$149.00	1999
Midland (MAF)	10/28 extension	$5.00	2008
Milwaukee (MKE)	7R/25L parallel	$5.00	1998
	7L/25R realignment	$5.00	1996
	7L/25R extension	n/a	n/a
Minneapolis (MSP)	17/35 air carrier	$120.00	2002
	4/22 extension	$40.50	1996
Nashville (BNA)	2E/20E parallel	n/a	n/a
	2R/20L extension	$38.60	2000
New Orleans (MSY)	1L/19R parallel	$340.00	2005
	10/28 parallel	$480.00	2020
Newark (EWR)	4L/22R extension	n/a	2000
Norfolk (ORF)	5R/23L parallel	$75.00	2005
Oakland Metropolitan (OAK)	11R/29L parallel	n/a	n/a
	11/29 etension	n/a	n/a
Oklahoma City (OKC)	17L/35R extension	$8.00	2014
	17R/35L extension	$8.00	2014
	17W/35W parallel	$13.00	2004
	13/31 1,200 ft. NW extension	$5.00	2005
Omaha Eppley Field (OMA)	14/32 extension	$9.00	1997
Orlando (MCO)	17L/35R 4th parallel	$137.00	2002
	17R/35L extension	n/a	n/a
Palm Beach (PBI)	9L/27R extension	$8.50	n/a
	13/31 extension	$1.00	1999
	9R/27L extension	$0.50	1997
Philadelphia (PHL)	8/26 parallel-commuter	$220.00	n/a
	9L/27R relocation	n/a	n/a
Phoenix (PHX)	7/25 3rd parallel	$88.00	1998
	8L/26R extension	$7.00	2000
Pittsburgh (PIT)	4th parallel 10/28	$150.00	n/a
	5th parallel 10/28	n/a	n/a

Table 2-4. New and Extended Runways Planned or Proposed

Airport	Runway	Est. Cost ($M)	Operational Date
Raleigh-Durham (RDU)	5R/23L extension & assoc. taxiways	n/a	2005
	3rd parallel	n/a	n/a
Richmond (RIC)	16/34 extension	$45.00	1997
Rochester (ROC)	4R/22L parallel	$10.00	2010
	4/22 extension	$4.00	2000
	10/28 extension	$3.20	2000
St. Louis (STL)	14R/32L	$250.00	n/a
San Antonio (SAT)	12L/30R reconstruction/extension	$20.00	2006
	12N/30N new rwy	$400.00	n/a
Santa Ana (SNA)	1L/19R extension	n/a	n/a
Sarasota-Bradenton (SRQ)	14L/32R parallel	$10.00	2000+
	14/32 extension	$5.10	1998
Savannah (SAV)	9L/27R new parallel	$15.20	2005
	9/27 1,000 ft. extension	$5.00	1999
	18/36 2,000 ft. extension	$3.90	2000
Seattle-Tacoma (SEA)	16W/34W parallel	$400.00	2001
Spokane (GEG)	3L/21R	$11.00	2001
Syracuse (SYR)	10L/28R	$55.00	2000
Tampa (TPA)	18W/36W 3rd parallel	$55.00	2000+
	9/27 reconstruction & extension	n/a	2010+
	18L extension	n/a	2005+
Tucson (TUS)	11R/29L parallel	$30.00	2005
Tulsa (TUL)	18E/36E parallel	$115.00	2005
Washington (IAD)	1L/19R parallel	n/a	2009
	12R/30L parallel	n/a	n/a
	Total of available costs:	$6,472.10	

n/a=no data available at press time

In 1992, Colorado Springs completed construction of a new 13,500 foot parallel runway, and Nashville and Washington Dulles completed runway extensions. In 1993, Detroit Metropolitan Wayne County completed construction of a new 8,500 foot parallel runway, and runway extensions were completed at Dallas-Fort Worth, San Jose, Kailua-Kono Keahole, and Islip Long Island Mac Arthur. In 1993, Memphis began construction of independent parallel runways, and Louisville Standiford Field began construction of two independent parallel runways. In 1994, Jacksonville opened the first 6,000 feet of a new parallel runway, and Kansas City completed construction of a new 9,500 foot independent parallel runway. The third air carrier runway was opened in 1995 at Salt Lake City. It is 12,000 feet long and 150 feet wide.

2.5 Airport Tactical Initiatives

The recommendations by Airport Capacity Design Teams have emphasized constructing new runways and taxiways, extending existing runways, installing enhanced facilities and equipment, and modifying operational procedures. These improvements are normally implemented through established, long-term procedures. The Office of System Capacity (ASC) has recently initiated an effort to identify, evaluate, and implement capacity improvements that are achievable in the near term and will provide more immediate relief for chronic delay-problem airports. Tactical Initiative Teams, made up of representatives from airport operators, air carriers, other airport users, and aviation industry groups together with FAA representatives, are now being established at selected airports to assess near-term, tactical initiatives and guide them through implementation.

The first of these Tactical Initiative Teams completed a study at Los Angeles International Airport with a final report issued in September 1993. The team evaluated the impact on the crossfield taxiway system of proposed new gates on the west side of Tom Bradley International Terminal immediately adjacent to the taxiway system. The study examined airport delays and their causes (with and without the expansion of the west side of the terminal) and evaluated the effect of adding additional crossfield taxiways to mitigate the delays caused by the expansion.

A study at New York's LaGuardia Airport to evaluate the impact of introducing the Boeing 777-200 folding-wing aircraft on airfield operations was completed in 1994. In addition to evaluating the effects of the new aircraft on capacity and

efficiency, the study examined the effects on safety, operating minimums, air traffic control procedures, and airway facilities.

A study at Orlando International Airport to evaluate the effects of proposed crossfield taxiways on airfield operations, a study to determine the effects of taxiway system improvements at Charlotte/Douglas International Airport, and a second study at Los Angeles International Airport to assess the impact of proposed remote commuter aircraft aprons on airfield operations were completed in 1995.

2.6 Terminal Airspace Studies

When an Airport Capacity Design Team study is completed, an airport has a recommended plan of action to increase its capacity. This plan will do little good, however, if the airspace in the vicinity of the airport cannot handle the increase in traffic. For this reason, the Office of System Capacity has developed a program of airspace capacity design team studies of the terminal and en route airspace associated with delay-problem airports across the country. Generally, these studies are intended to follow Airport Capacity Design Team studies. The first of these Terminal Airspace Studies was completed at San Bernadino International Airport (the former Norton Air Force Base). Studies are underway at Tampa International Airport, Salt Lake City International Airport, and Minneapolis St. Paul International Airport.

2.7 Regional Capacity Design Teams

Looking beyond the individual airport and its immediate airspace, the Office of System Capacity is planning a series of Regional Capacity Design Team studies. These regional studies will analyze all the major airports in a metropolitan or regional system and model them in the same terminal airspace environment. This regional perspective will show how capacity-producing improvements at one airport will affect air traffic operations at the other airports, and within the associated airspace. The first of these regional studies is planned for the San Francisco Bay area.

2.8 Airport Capacity Design Team Updates

The present Airport Capacity Design Team effort began in 1985. Many of the capacity-producing recommendations made by these Airport Capacity Design Teams have been imple-

mented or are scheduled for completion, others may need to be reevaluated, and still others may no longer be appropriate. For some airports, particularly those with studies completed in the 1980's, conditions may have changed to a considerable extent, and a comprehensive new Airport Capacity Design Team study may be needed to bring the airport up to date. For other airports, changes in one or more of the conditions at the airport may only require a more limited update. An Airport Capacity Design Team Update was conducted at Seattle-Tacoma International Airport to evaluate the impact of a proposed new dependent runway on airport operations and to examine the interaction between operations on the new runway and existing operations at Boeing Field/King County International Airport. A second update was recently completed at Hartsfield Atlanta International Airport. The results of this update study included recommendations for the construction of a new independent runway as well as additional high speed runway exits. Additional Airport Capacity Design Team Updates are in progress at Memphis and Maimi.